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THE MASTER OF THE QUORN.

The annual judging of the Quorn Hunt puppies took place at Quorn on August 5th. There was of course the inevitable lunch to follow, and the usual rural oratory. Perhaps it is hardly fair to take too seriously remarks made under the circumstances, but we must protest against an assertion made by the Master. Had one of the kennelmen been the spokesman we should have said nothing, but—*noblesse oblige*. When the Master of the Quorn talks about horses or hounds or vocations connected with them we expect knowledge. Ladies and gentlemen hearing Captain Burns-Hartopp on matters usually within the comprehension of a M.F.H. are likely to accept his *dicta* without much question. Some sportsmen really understand horses and dogs—few know anything of their diseases, and the latter class includes Captain Burns-Hartopp.

Thus spoke the Captain—"A great discussion was going on about the cure of distemper, and vaccination was a good deal talked about. While the science of medicine had advanced by leaps and bounds in recent years, veterinary science had stood still, if not gone back. . . . He thought the veterinary profession were very behindhand in not practising, and that experiments like this ought to be made on animals which were not of such value as those of the Quorn."

With the last sentence we find no fault. We agree that experiments on distemper are wanted and that they should be made by veterinary surgeons. Scientific experiments are costly, and occupy time. We know quite as much about distemper as medical men know about measles, but we should like to know more. Every human hospital has a pathological laboratory attached to it. and public subscriptions flow in to these and other medical institutions.

Veterinary institutions receiving public assistance there are none save the Royal Vet. Coll., and it has an annual sum granted by the Royal Agricultural Society who obtain value for their money in the shape of investigations concerning horses, cattle, sheep, and swine. Before the owners of dogs cavil at the want of scientific investigation made by veterinary surgeons on the diseases of dogs they should be able to point to the assistance they have given the profession. Has a master of foxhounds ever yet subscribed a shilling to aid scientific canine pathology? It would be easy to name a dozen veterinarians who in the last 20 years have done good work for canine medicine and surgery.

Captain Burns-Hartopp's general libel upon veterinary science in this country is unworthy a man in his position. He does not know anything of the work that has been done on Tuberculosis, Anthrax, Glanders, Blackquarter, White-scour, Contagious Abortion, Navel-ill, Louping-ill, Pleuro-pneumonia, Rabies, and Rinderpest. If he would enquire of persons better informed than himself he would apologise.

We are proud to acknowledge the progress of medical science, and no step in it has been neglected by veterinarians. We conscientiously claim, comparatively, even greater progress.

ROARING.

Professor Thomassen is tempted to publish some of the notes of his researches on "Roaring" in the hope that they may be of use in the present state of incomplete knowledge on the subject.

In all cases of laryngeal roaring there exists a stenosis of that part of the air tract. When the stenosis is situate in the nasal cavity the noise is essentially different from that of roaring and immediately marks the affection as nasal dyspnœa.

Though there are various causes of laryngeal stenosis one may say that in 95 per cent. of cases the fundamental cause of roaring is an unilateral paralysis of the larynx, the rest (5 per cent.) are due to stenosis from deformity as a consequence of tumours or abnormalities seated in the larynx or trachea. For instance, in one old horse pisiform chondromatous nodules in the trachea; in another a polypus on the right vocal chord, and two small ones on the arytenoid; in a third a polypus as big as a nut on the right vocal cord; in a fourth a multiple growth on the upper margin and internal face of the right arytenoid; in a fifth a tumour compressing the posterior crico-arytenoid muscle.

In 95 per cent. stenosis of the larynx is the consequence of hemiparesis or hemiplegia of a nervous nature which affects the left half. All the muscles except the crico-thyroid, the other muscles especially the posterior crico arytenoid are more or less degenerate (atrophied). The paralysis, total or incomplete, of this dilator of the larynx suffices to produce roaring. This atrophic degeneration of one or all the muscles is not of myopathic origin as in man and other animals but is primarily neuropathic.

The original lesion in man is recognised as cerebral, bulbar, or peripheral. The seat of the cerebral lesion is in the cortex and the paralysis is limited to functional disturbance of the constrictor muscles.

The bulbar form produces paralysis of the dilators and this form undoubtedly occurs in the horse, but is of the rarest occurence. Flanders and the islands of Zealand are the localities where it is mostly seen.

The peripheral form has an exciting cause, the compression of the vagus from cervical tumours, cancer of the œsophagus, tumours on the thyroid or mediastina, aneurism of the aorta, compression of the right recurrent, aneurism of the right subclavian, pericarditis, pleurisy.

The peripheral form demands the most attention in veterinary pathology since 90 per cent. of the cases of roaring in horses are due to a nervous lesion, and that purely peripheral, this can be proved by section and irritation of the superior and inferior laryngeal nerve and the vagus.

In the horse section of the recurrent has a great importance in this question, and has received great attention.

In 1821 Dupoy practised section of the nerve or interfered with its function by compression; roaring ensued in each case and autopsy revealed atrophy of the muscles of the larynx.

In 1838 Youatt in England practised ligature and section of the nerve. Gunther studied roaring for many years, and in 1834 published three cases of section of the nerve in horses. The first was a young mare who roared badly after the operation. The second was a middle aged horse who after section of both recurrents had such acute dyspnœa that he had to be relieved by tracheotomy. The third was a horse of 26 years who made a slight noise after section of both recurrents which increased greatly at the trot, but he did not present symptoms of asphyxia. Other authors refer incidentally to neurectomy, generally unilateral, and always refer to noisy respirations during movement as a subsequent symptom.

Longet, in 1851, differentiated the symptoms in the horse and adult and young bovines.

In cases of unilateral section of the nerve in horses of different ages it has been noticed that in those over 12 years the roaring produced was slight and almost disappeared after a five minutes trot. In younger horses it was not so acute as in cases of spontaneous unilateral paralysis of the recurrent.

Case I.—Five-year-old mare, excision of a part of the right recurrent; immediately after she whistled, and if trotted any distance there was an abnormal noise. Two days later at trot and gallop the noise was only noticeable when quite close and ceased when the horse stopped. Before section the nerve was stimulated electrically. This will be referred to again later on.

Case II.—A ten-year-old horse roared badly after section of the right recurrent. Three months later the roaring was very slight.

On post-mortem the right arytenoid cartilage was very slightly moveable. Immediately after the operation the peripheral part of the nerve was connected to the vagus by catgut. These seemed to have perfectly united. When the horse was slaughtered three months after operation there was no pronounced atrophy of the dilators or constrictors. The muscles of the right side, however, had to a great extent lost their striation. Microscopic examination showed that the recurrent nerve had not re-acquired its normal conductivity, and the peripheral part was completely degenerate yet the roaring, as has been noticed, was very slight even from the first.

Cases III. and IV.—In these two cases atrophy of the muscles of the larynx after section of the nerve was much more advanced when the animals were killed after two months There has been a slight roaring, as might be expected at their age (20 and 14 years). The soft parts of the larynx were somewhat rigid, though the dropping inward of the arytenoid was less marked. Section had been performed on the left recurrent and all the muscles on that side presented a very marked atrophy and were paler than those of the right. Other horses had their nerves cut and were killed directly after; in these cases there was no perceptible anatomical alteration.

In one of these cases, after section of the left vagus without interference with the sympathetic, the pulse increased in frequency to 100 and respiration became slow and deep. At work he roared; five days after the operation the pulse became normal, but the respiratory disturbance continued.

The anatomical and pathological alterations consequent on section of the recurrent are: the affected muscles are paler, their lessened size is in marked contrast to those of the other side. These alterations are most apparent in the posterior crico-arytenoid. It is stated that normally this muscle is less developed on the left than on the right so that the right should be chosen for experiment. Microscopic examination shows that at the edge the muscle bundles are diminished to two-thirds their volume, striation almost vanishes while the interstitial connective tissue becomes hypertrophied and interwoven with the muscle bands of the . The nuclei of the connective tissue cells increase in number as if to fill up the inter-fibular space.

Section of the Superior Laryngeal Nerve.—In the horse this nerve is looked upon as exclusively a nerve of sensation, and dissection shows that it does not furnish any motor filaments to the muscles of the larynx, in fact according to some experimentors its function can be most clearly demonstrated.

Möller (*Das Kehlkopfpfeifen des Pferdes*, Stuttgart, 1888, gives account of two experiments of section of this nerve. A horse killed six weeks after the operation had exhibited laryngeal dyspnœa and atrophy of the muscles. A second horse killed four months after the operation had not shown any respiratory difficulty but the muscles were greatly atrophied. Möller concludes that the superior laryngeal contains trophic fibres and that a partial atrophy of the muscles is not enough to determine roaring.

Later (*Centrablatt f. Physiol*) Gunter, of Vienna demonstrated that stimulation of the superior laryngeal in the living subject gave indications of muscular contraction. Examination by the laryngoscope showed that the movements of both sides of the larynx were normal and then the nerve was cut, immediately after. The left vocal cord and arytenoid became fixed, and the vocal cord assumed the position found in dead animals.

Pincles (*Pfluger's Archiv.*) 1901, found in the muscles clear signs of degeneration which he considered completely different to those connected with section of the recurrent. Six weeks after section of the superior laryngeal nerve in a horse, the muscles including the crico-thyroid had assumed a tint varying from pale rose to yellow. The histological characters were very similar to those of progressive muscular atrophy. The muscular fibre was atrophied, some being hypertrophied, the hypertrophy preceding the atrophy. Bruer considers this to be due not to a trophic alteration but to arise from the atrophy consequent on inaction. The loss of sensibility appears to influence the amount of motor disturbance.

Breisacher and Gutzlaff, of the Berlin School, come to a totally different conclusion from their experiments. In two horses they removed a part of

the superior laryngeal near the thyroid cartilage, and 16 days after killed the animals. All the laryngeal muscles were normal. In the dog and rabbit, section of the superior laryngeal did not produce any degeneration of the muscles to which it was distributed.

Some years later Gnuer repeated his experiments and failed to obtain his former results. In two horses operated on there was no paralysis, and the muscles were healthy.

Munk denies that there is any value in Breisacher's experiments, he attributes the paralysis and muscular atrophy to a fortuitous paralysis of the recurrent, especially as both animals were operated upon on the left. He states that many horses have an incipient muscular atrophy on the left without any disturbance of respiration.

In a mule, 18 years old, section of the right nerve in the immediate vicinity of the thyroid cartilage was performed. After two months there was no roaring. Two days before slaughter the dorsal face of the larynx was laid bare and the right arytenoid cartilage was easily seen to be in the position usually found after death, while the left showed mobility plainly. Upon post-mortem the muscles of the right side were like those of the left, and there were no traces of histological alteration. The loss of mobility was probably due to loss of sensibility of the mucosa. All experiments go to prove that a functional disorder of the superior laryngeal nerve cannot be considered as a cause for roaring.

The different results arising from section of the superior laryngeal nerve may be accounted for in this manner: Six c.m. from the thyroid cartilage one may see in any larynx the nerve dividing into two great branches, one of which runs along the ordinary orifice while the other, two c.m. beneath, goes into the cavity of the larynx along the upper face of the thyroid cartilage. Probably this lower branch gives off more muscular branches than the upper.

Electrical Stimulation of the Laryngeal Muscles.—Currents of various intensity applied to the superior laryngeal nerve do not excite any particular action.

Stimulation of the recurrent with a strong intermittent current was followed by dilatation in three living horses. When the point was applied 14 c.m. from the larynx it produced in a horse that was cast (down) an unilateral stimulation with marked contraction, followed by loud roaring, which persisted when the intensity of the current was much diminished. This occurred in every case where the experiment was repeated, hence it may be inferred that a strong current produces dilatation and a weak one contraction.

In a three-year-old horse which roared badly on account of paralysis of the left recurrent, electric stimulation produced no laryngeal dyspnœa in the recumbent animal. The nerve laid bare was supported on two glass rods and the result of stimulation was strong contraction of the sterno maxillosis and sterno hyomastoideus. It appeared possible that there was an anastomosis of fibres with the accessory, but after section of the recurrent there was no contraction upon stimulation of the central end. Evidently the cause lay in the periphery.

The contraction arose from the passage of the current from the stimulated nerve to its neighbour. Indeed the muscular branch of the accessory nerve passes beneath the recurrent, crossing immediately beneath the larynx. Some say that they have observed movements of a vocal cord upon stimulation of the central end of the cut recurrent of the opposite side. Others deny the possibility of this as the recurrent has no centripetal fibres.

Circumscribed paralysis of the posterior crico-arytenoid muscle of this sort has not been found in man, and it may exist for years without the constrictors or the crico-thyroid undergoing the slightest alteration.

What are the consequences of paralysis of the dilators? What influence has it upon respiration? When the dilators alone are affected contraction of the other muscles produces stenosis of the larynx, more pronounced in cases where the degeneration affects all the muscles in equal measure. Is it possible then in some cases of roaring of recent origin and severe character that the cause lies in contraction of the constrictors?

After section of the recurrent, however acute, roaring has not been noticed in young horses. Möller has only found a slight noise when the arytenoid was completely fixed, while loud roaring has occurred when the cartilage remains more or less mobile.

One may infer that section of the recurrent would be of use in the graver cases of nervous roaring. But experience fails to establish the benefit expected. On the other hand experimental research demonstrates that age has a marked influence on the extent of laryngeal stenosis and therefore upon roaring. The younger the animal is the greater the noise after section of the recurrent as well as in paralysis due to spontaneous or clinical causes. Doubtless some old horses roar badly when the stenosis is due to hemiplegia. At other times in horses above 12 years section of the nerve has produced a roaring so slight as to be scarcely perceptible at the trot and inaudible after stopping.

This is accounted for by the greater rigidity of the tissues in old animals which permits the arytenoid the better to preserve its lateral position When the recurrent is paralysed the corresponding arytenoid remains immobile at base of the lumen of the larynx. One sees in fact at the commencement of inspiration a short sharp movement upwards and outwards, this is produced by the action of the crico-thyroid in its normal, or possibly hypertrophied condition, which raises upwards and outwards the fold of the cricoid, and possibly also slightly the arytenoid attached. The column of air inspired brings back the arytenoid to its original position, and by so doing if the current is strong closes the larynx in the middle line and blows out the corresponding gutteral pouch. In time the cartilage becomes rigid in this position, and the more the soft tissues are diseased the more the arytenoid inclines inwards and downwards. Dieckerhoff maintains that this disposition of the left arytenoid may be aggravated by hypertrophy of the arytenoid muscles on the right side. In the case just described it is possible that this cartilage may have been kept more or less in the

inspiratory position by reason of total degeneration of the connective tissue of the muscles. *The noise of roaring is due principally to the impact of the air inspired against the upper margin of the arytenoid closing the central aperture.* The position of the vocal cord is of little importance.

Spontaneous paralysis of the recurrent in the horse is nearly always situated on the left. Many authors affirm this, and none have noticed it upon the right. Gunther and Dieckerhoff have never seen it in the right. Prinz has found it once post-mortem. Gerlach says that in the Berlin College there is a specimen of Gurlt's in which the aryngeal muscles on the right have vanished and the right recurrent shows a scar. There are no other recorded cases of local paralysis affecting the right side alone. The writer has been fortunate enough to obtain possession of a highly interesting preparation, viz., the larynx of a two-year-old horse suffering from nasal dyspnœa due to a chronic serous catarrh. Atrophy of the muscles of the right side is extraordinarily well marked, muscle being replaced by fibrous tissue. When the horse was trotted round a hundred metre ring several times there was no laryngeal sound, but when he neighed his voice was very hoarse, i.e., aphonic. The absence of laryngeal roaring in this case was due to the fact that the column of inspired air was minimised by the stenosis of the nasal cavity.

F. E. P.

(To be continued)

HEARTWATER IN SHEEP AND GOATS.

In previous reports I have pointed out that the experiments conducted principally by Veterinary Surgeon Dixon clearly demonstrated that heartwater was not communicated by the ordinary sources of infection, such as immediate contact, if the in-contact animals were kept free from ticks. It has also been shown that it is not due to any particular plant which the stock eat, because goats which were allowed on infected veld with a flock, but muzzled so as to prevent them from feeding, and were only fed on good sound forage at night, contracted the disease as readily as if they had been allowed to graze ; nor is it induced by the lack of any essential food constituents such as common salts or phosphates in the general vegetation of the infected area, for goats which were fed exclusively on good forage, and in addition received a daily ration of bone meal and saline constituents for several months consecutively, readily contracted the disease when exposed to veld infected. The experiments also demonstrated that the cause was neither atmospheric nor telluric, for goats which were tied up in the low lying spots, specially selected in one of the most infective localities, the vegetation being previously destroyed by fire, and all other sources of infection—especially ticks—excluded, the animals remained perfectly free from any appearance of infection, although proved by subsequent experiment to be susceptible.

Drenching animals with large quantities of the fluid contents of the rumen of goats which died, or were killed, during an attack of heartwater failed to communicate the disease, and even large doses of virulent blood administered by the mouth also failed to produce the disease. In fact where tick infection was excluded Mr. Dixon failed to communicate the disease to healthy sheep and goats, except by inoculation with virulent blood, obtained from an affected animal.

It became very clear, therefore, that heartwater belonged to that class of diseases which owe their origin to some living micro-organism, which, when introduced into the blood of a susceptible animal, multiplies and develops in that vital fluid, and gives rise to all the characteristic pathological changes which are observed in that disease. There is the period of incubation—from eight to ten days—followed by fever, and terminating in an effusion of a clear straw-coloured albuminous fluid into the thoracic cavity and pericardium, with other less marked changes. The characteristic of this fluid is that it coagulates into a jelly as soon as it is exposed to the atmosphere.

The result of these experiments led us to suspect that ticks, or some such skin parasites, were the active medium of communicating the infective agent of heartwater by skin inoculation. Mr. Dixon then commenced a series of experiments with the red and the blue ticks—*Rhipicephalus evertsi* and *Rhipicephalus decoloratus*—respectively, but with negative results. He tried at the same time to hatch out the larvæ from the eggs of the Bonte-tick — *Amblyoma hebraum* — but failed owing to an unusual peculiarity in the conditions and periods of incubation, subsequently discovered by Mr. Lounsbury, the Government Entomologist, who at this period recommenced the study of the tick side of this question, which he has continued to prosecute in a most enthusiastic manner ever since and with the most satisfactory results, as his annual report for the past year will show. Mr. Dixon then devoted his attention to the discovery of a preventive remedy by means of inoculation. He found that the disease was communicated by inoculation either subcutaneously, intravenously or intra-thoracic, the media used being virulent blood, spleen pulp, and also occasionally the thoracic and pericardial fluid when fresh. He found that the disease can be transmitted by these methods from sheep to sheep, from goat to goat, and from sheep to goat, and from goat to sheep.

The following are the lines on which a series of experiments were undertaken, first by Mr. Dixon and continued and enlarged upon by Mr. Spreull, with the object of discovering a method of preventive inoculation.

Inoculation with bile.—A series of inoculation experiments with bile obtained from an animal which died of the disease were tried in varying doses, but it was soon apparent that bile gave very little immunity, although some farmers extolled it highly. The fact that the disease will sometimes cease to spread in a flock without any obvious cause may account for this temporary popularity which the bile obtained.

The blood and serum of Cattle and Horses.—Inoculations with the blood and serum of cattle and horses after these animals had been fortified by the injection of large doses of virulent blood were tried, but although the blood and serum of these naturally immune animals, especially of the horse, possessed a certain amount of antitoxic action, injections of even large doses gave but a very slight immunity against either artificial or natural infection.

Preserved virulent blood.—Inoculations with virulent blood which was preserved (*a*) by adding 5 per cent of glycerine, or (*b*) ½ per cent. of carbolic acid in a watery solution, were tried, the mixtures being kept for 24 hours before being used, but the results obtained by either of these methods were very irregular and uncertain.

Citrated virulent blood.—This citrated virulent blood was mixed in normal saline solution, 1 to 3, and kept for varying short periods and then injected intravenously, but it proved very irregular in its action and effects.

Serum of virulent blood.—This was used fresh one to two days after tapping. filtered through paper. One goat received 7 c.c. intravenously without producing any reaction, but when tested with 2 c c. of virulent blood intravenously, on the fortieth day it took sick, and died fourteen days later. Another goat received 10 c.c. intra-

venously, no reaction followed, nor did it react to 2 c.c. of virulent blood injected intravenously on the twenty-seventh day, but when retested with 3 c.c. on the fiftieth day, it died fifteen days later. This line of experiments was therefore abandoned.

Antithermal blood.—Experiments were undertaken with the object of ascertaining the period at which the blood becomes virulent in an animal sickening from heartwater. These showed that the blood becomes virulent in an acute case produced by inoculation, from 24 to 48 hours before the onset of the fever. In one very rapid case the virulence of the blood appeared six clear days after the intravenous injection of virulent blood.

Small intensive doses of virulent blood.—This series of experiments were undertaken with the object of intensifying the modified reaction obtained by the injection of small doses of virulent blood intravenously. For example, a dose of 1.5 c.c. of fresh citrated virulent blood injected intravenously fails to produce sickness by itself, but the same dose repeated on the ninth day caused death, and even when the second dose was delayed until the twelfth day, it still produced fatal results. When delayed until the sixteenth day no fatal results followed in five animals so treated, yet no good reaction followed. Mr. Spreull adds : "Further experiments may show that better results may be obtained if the second inoculation were performed about the fourteenth day, but individual susceptibilities vary so greatly that success in this line is not very hopeful.

Serum experiments.—With respect to these Mr. Spreull reports :—In our early work with heartwater it was found that the fortified serum of a recovered animal was strongly antitoxic, and since then many attempts have been made to so balance a lethal dose of virulent blood with an inhibitive dose of serum that a mild sickness or fever reaction and recovery might be obtained. Bad as results have been up to the present (this was written in September last), it is this method which has produced almost the whole of the salted animals we possess, and it has consequently continued to attract our attention and inspire us with hope. When I relieved Mr. Dixon, I took over four full-grown goats—Nos. 136, 137, 138 and 139—into which he had injected intravenously 3, 4, 5 and 6 c.c. of a two to one mixture of carbolized serum and fresh citrated virulent blood ; not one of these animals reacted, but when on the twenty-seventh day I repeated the inoculation, using exactly the same doses to each, but altering the proportion of the mixture to seven of serum to four of virulent blood, I killed all four without any lengthening of the incubatory period. The serum used in this case was not the same, but was thought to be equally potent. It was used again in the next three experiments, and with slightly better results. Nos. 140, 145 and 146, kids from eight to ten months old, received into the vein 6, 5 and 4 c.c. respectively of a mixture of virulent blood four parts, with carbolized serum seven parts, kept twenty-four hours before using it. No. 140 died from heartwater on the fifteenth, No. 146 on the eighteenth day, both being fevered for three days, whilst No. 145 did not react. On the twenty-fifth day No. 145 received exactly the same dose for the second time, and again showing no reaction, it received the same dose, 5 c.c., of a mixture in which the blood proportion had been raised to nine-fourteenths of the whole. This produced sickness, and death fifteen days after injection, fever lasting five days. On September 11th three goats, Nos. 199, 201, and 202, each received intravenously 2 c.c. fresh virulent blood and 3 c.c. carbolized serum, which were mixed together just previous to injection. This was followed by a subcutaneous dose of the same serum, No. 199 receiving 5 c.c. on the 13th. No. 201 5 c.c. on the 14th, and No. 202 6 c.c. on the 15th day. No. 201 died suddenly on the 16th day, the autopsy being typical, No. 202 also showed sick on the 16th, and died next day. No 199 gave a most remarkable and prolonged reaction extending from the 17th to the 40th day or later, being generally mild in character except on the 33rd day, when it suddenly reached 106° F. in the morning and 107·7° F. in the afternoon, falling during the next two days to a mild fever level, the end of which it is difficult to fix with exactitude. This extended fluctuation gives one a remarkable insight into the slow manner in which an attenuated Heartwater vaccine must effect its results upon the animal system, and sounds an ominous warning against early testing. Blood was drawn from this No. 199 on the 23rd day, and 3 c.c , 5 c.c., and 10 c.c. injected into goats Nos. 209, 170, and 159 respectively. No. 170 reacted well and is probably salted, but the other two became violently fevered, in both cases up to 108° F., fed sparingly, and in fact narrowly missed death from Heartwater. Other goats have been inoculated with No. 199's blood taken at later periods during its reaction, but it is too soon yet to speak of results.

The Blood of a recovering animal.—The object of this series of experiments is explained by Mr. Spreull as follows : My previous experiments in connection with heartwater taught me that the blood of an animal recovered from the disease became mildly antitoxic some weeks aftewards, and could be made strongly so by fortification. It occurred to me, therefore, that there must be a period of transition between the febrile or virulent, and the antitoxic stages. In the hope of obtaining a blood falling short of lethal, yet strong enough to set up changes in inoculated animals which would induce immunity, I instituted a series of inoculations at varying intervals with blood taken from recovering animals.

Mr. Dixon had previously performed two inoculation experiments in this series with 5 c.c. of blood at five and nine days respectively, and both these animals died. I therefore began with a later and more attenuated blood, performing half of the inoculations intravenously and half subcutaneously. These inoculations were made at 11, 15, 16, 20, and 25 days after the fever stage had passed. The results were extremely irregular at first, many did not react to the inoculation, while others had varying degrees of fever, but none of them withstood the subsequent test of virulent blood, even when the testing dose was gradually reduced from 5 c.c. to 2 c.c. What led me to expect immunity from these recovering inoculations was the fact that blood taken from these reacting goats ten days or more after their reaction had ceased, very often produced a similar elevation of temperature in a third, fourth, fifth, and sixth series of goats. In no case did these reactions show any sign of illness, yet the fever was often so acute that I dreaded the onset of the fit which so rapidly terminates cases of real heartwater.

I next tried a simultaneous injection. Two goats received each 10 c.c. of blood obtained from a reacting goat of the fifth series on the 16th day, when it was highly fevered, and to this was added 1 c.c. and 1.5 c.c. respectively of virulent blood. Both goats reacted to this inoculation severely, one from the 10th to the 15th day, and the other from the 12th to the 16th day, in both a temperature of 107° F. was registered, yet no visible symptoms of disease appeared.

Referring to this series of experiments in a subsequent report Mr. Spreull says :—"Since my last report, I have kept up a new chain of reactions, little short of the actual disease in their virulence, by always selecting animals in which symptoms were developed, and waiting until the tenth day, or later, after the temperature became normal ; by these means the same pitch of virulence seemed to be well maintained. By tapping earlier, that is, before the reaction ceased, lethal blood, indistinguishable from true virulent blood, could be obtained. On the other hand, by delaying until the 20th day or later,

after the cessation of the fever, mild reactions, or none at all, were produced."

After detailing a long series of experiments on these lesions, Mr. Spreull continues: "From the above it will be seen that any dose of 3 c.c. or more of recovering blood is sufficient, and that we can with moderate care hit upon a period of safety at which fairly severe reactions can be produced with certainty and continued in series." At a later date he returned to the experiments with simultaneous inoculation intravenously of small doses of a mixture of virulent blood and of recovering blood. He says: "Observing that it became more and more difficult to produce a reaction by inoculating fresh goats with blood drawn from a goat twenty days, or over, after the temperature had returned to normal, I attempted to strengthen this blood by the addition of a small—that is, less than a lethal—dose of virulent blood, and after a number of failures, I think I can claim to have fixed a date when this can be done with comparative safety."

After detailing the series of experiments which led up to this result, he makes the following recommendations: "As 2 c.c. occasionally proves lethal, 1 c.c. or 1.5 c.c. is enough to give in this method of inoculation, and I would make the amount of this dose depend upon the age of the recovered blood, or the number of days after cessation of the fever in the goat which is bled to provide the recovered blood."

The intensity of the attack has also to be considered. The dose of the recovered blood may be anything over 3 c.c., as it appears immaterial whether 5 c.c. or 10 c.c. is used.

The inoculating mixture therefore consists of (*a*) less than a lethal dose of virulent blood, and (*b*) blood from an animal just over 30 days recovered. In these experiments Mr. Spreull points out that subcutaneous inoculation is never so regular and satisfactory as intravenous inoculation, even when the same materials are used.

The test to which the inoculated goats are put.—Mr. Spreull concludes his report as follows:—"If you have succeeded in following all these details, you will be prepared to admit that something little short of virulent heartwater has been produced—a scrutiny of the charts should satisfy you on that point—and I am sure that an inspection of the animals would have convinced anyone. In many of the *reacters*, the appetite disappeared, the respiration became hurried, decubitus was constant, and nothing but the fit seemed wanting to complete the very short train of symptoms which are witnessed in the heartwater contracted on the veld."

But notwithstanding these strong fever reactions, many fail to resist the intravenous injection of 5 c.c. of virulent blood, or even a 3 c.c. dose. The question arises, is this intravenous test too severe? It is very evident that no animal which has not shown a fever reaction of 106° F., and over, for at least a week, can withstand an intravenous injection of even 3 c.c. of virulent blood. The next question is, how many of those animals which give a strong fever reaction, but fail to stand the test inoculation, would be able to resist veld infection? Experiments show that a 3 c.c. dose of virulent blood injected intravenously would kill 95 per cent. of healthy susceptible animals inoculated with it, but veld infection falls far below that. The point for future consideration and experiment, therefore, is what fever reaction will be sufficient to withstand veld infection, and to this Mr. Spreull is directing his attention at the present time.

D. Hutcheon,
Colonial Veterinary Surgeon.

Cape Agricultural Journal.

VETERINARY SOCIETIES

NORTH WALES AND MONMOUTHSHIRE VETERINARY MEDICAL ASSOCIATION.

RED-WATER IN CATTLE.

By E. Wynne Williams, M.R.C.V.S., Dolgelley.

(Read at the meeting at Rhyl, in March.)

When I consented to read a paper upon this subject I little thought that what had been written upon redwater was short and confused, and I have been thereby prompted, if you will allow me, to do my best to bring the subject of Redwater before you in my own simple way, having had for over twenty years to deal with this disease in its different aspects in a country where it is very prevalent; and I trust that you will find something that I shall say will provoke a good discussion.

Although this is an age which treats largely of micro-organisms the most important thing for any practitioner still is the clinical aspect of the different diseases; at the same time we cannot afford to lose sight of the purely scientific side, for clinical observation and scientific work react upon each other.

What is spoken of as redwater or blackwater is really a symptom of the diseased condition. It is my intention to consider it as two separate morbid conditions of the urine, viz., Hæmaturia or Redwater and Hæmo-albuminuria, Hæmoglobinuria or Blackwater. It really divides itself.

Hæmaturia, or Redwater.

This is a symptom of several morbid conditions in which you find the blood escaping into the urinary tract from blood vessels. The colour of the urine depends upon the quantity of blood and action of the salts of the urine upon the blood pigment. The colour varies from a bright red to a dark brown or chocolate.

Causes.—These may be classed as extrinsic and intrinsic.

Extrinsic.—Blows or strains, so as to give rise to direct rupture of a vessel in the kidneys, which may or may not result in nephritis. I have seen cases in which the animal bled to death through the urinary tract. I have only seen ruptures of this kind occurring in cows.

Intrinsic.—As the result of nephritis arising from colds or irritating drugs, such as turpentine, cantharides, and certain irritating plants. It occurs as an enzootic disease, the character of the soil and herbage, having a deal to do with it. In the horse, especially mares, I have seen four cases arising from eating dog mercury. In cases of this kind we have the urine even black with blood corpuscles, renal epithelium, and fibrinous matter; the quantity of blood in the urine measures the severity of the case.

Passive congestion, or tumour in the kidneys; in these cases the blood would be from the substance of the kidneys.

Calculus in, or tuberculosis of the kidneys; in these we often have profuse hæmorrhage.

Then, again, there is direct rupture of vessels in the kidneys from some weakening condition of the organ, there being some indirect influence on this organ in cows that are heavy milkers. This is a common occurrence in this country.

Hypertrophied condition of the bladder; this undoubtedly arises from the action of the plants of certain localities which are not uncommon on certain farms.

Symptoms.—The great characteristic is the urine, which we find varying in colour from a bright red to

a dark chocolate. As far as others are concerned it varies as to what the morbid conditions arise from.

If from nephritis, we have a fever up to 106° F., pulse wiry, hurried breathing, and pain upon pressure on the loins, the colour of urine gives us an idea as to its severity, In the ordinary cases we find arising from other causes without any complication little if any rise in the temperature, bowels natural, animal eats well, pulse affected to an extent by loss of blood; the colour and character of the urine assists the diagnosis. If the urine is mixed with albumen, renal casts, epithelium or fibrinous matter, it points to the kidneys as seat of the disease, if clots of blood or turbid urine without casts, we may look to the bladder for the mischief. In tuberculous cases we find in nine cases out of ten that other organs are affected. We find cases at any period during the year, and as a rule cows are affected. I have never come across a bull or bullock affected with redwater either in one form or another.

Pathology and Morbid Anatomy.—I do not think I can do better than give the results of 11 post-mortems which I have performed of animals that have died or been killed.

Three with tuberculous kidneys. Two of these had tubercle in the lungs, lymphatics, and one kidney; the other organs were comparatively healthy. The other case had tubercle in the lungs, bowels, lymphatics, and both kidneys. One of these cases had hereditary predisposition—the mother died exactly the same, but lived to a good age, the cause of the hæmorrhage was a breaking down of the kidney substance by deposit of tubercle, also small abscess forming and causing a rupture of the renal vessels.

Four cases of thickening of the bladder itself. Three of these were fattened and killed, the other one died from loss of blood. The bladder in these cases was very much thickened and it seemed to have lost its ordinary appearance, it had become uneven, and had small blood vessels opening direct into the organ. All other organs in the body were healthy. This hypertrophied condition of the bladder seems to have been brought about by some peculiar herbage of those special farms where we find this disease, in each case it was a woody, undrained land. The cows were from 2 to 5 calf.

Two cases of rupture of vessels. They simply had bled to death, very heavy milkers. All organs were healthy but the kidneys flabby and softer, and the renal vessels simply seemed to have given way. There seemed to be a very close affinity between the udder and the kidneys, as this is a more or less common condition. I never came across any but in a heavy milker.

Two cases of tumours on the bladder. What seemed to me a fibrous tumour, with several vessels opening from it direct into the bladder. These tumours grow upon the floor of the bladder. The urine in these cases at times was brown (light) turbid like, with small streaks of blood here and there through the water. These cows fattened well at grass, did well as far as putting flesh on was concerned. One tumour weighed 3lbs. 2 ounces, the other was but small. One was a 4th calf cow, the other 6th.

Prognosis.—Those that arise from sprain or blows to the loins, and from nephritis caused by eating irritating plants and drugs of irritating effect on the kidneys are favourable. The others, if allowed to run their course, die in about two or three years, but if started by drying the cow and fattening will be fit to slaughter in about six months, with exception of the tuberculous.

Treatment.—Dry the cow in ordinary cases as soon as possible, feed well, as they require more food than ordinary for fattening. If from kidneys apply blister to loin if no nephitis, or pitch plaster. Hypodermic injection of ergot, or ergot in other form will be found in some cases beneficial. Strong doses of iron and quinine, strong astringent in ruptured vessels. For nephritis aperient, tr. aconite and bellad., and potass acet.

Blackwater in Cattle.

Synonyms.—Hæmo-albuminuria or hæmoglobinuria.

Definition.—A disease common to bovine of all ages and sexes, in which we have the urine from a red to a black colour. Ushered in by extreme diarrhœa followed by obstinate constipation, and the urine being at the commencement of the disease of a red colour. The colour depends upon the hæmoglobin from the disintegrated blood corpuscles.

Causes.—This seems to be an enzoötic. It appears to be very common indeed in some counties or localities, of which the County of Merioneth is one of the worst. It is very plain that neither age, sex, or breed has anything to do with it, the youngest calf that I have seen attacked was two months old. It is very rare for the same animal to have it more than once. The chief factor that causes the disease is any sudden change that gives the gastro enteric or hepatic system a shock, such as change of grazings from uplands to lowlands or the reverse—they can bear the change to a better with less risk; cold nights, after hot days, in dry seasons with scarcity of water it is most common, also oak leaves have had the credit, but I cannot say that they do.

Symptoms.—The animal, if out, will separate itself from the rest of the herd, seek quietude and will generally be found lying down, does not care to be moved, coat staring. As a rule you get but little rise of temperature, say 102, but at other times it rises to 106; the heart's action is very characteristic of the disease, it is very audible even some distance before you get to the animal, a peculiar double sound, the bowels are very loose, fæces ejected with great force, the anus being contracted; peristalic action of bowel barely audible on auscultation. The looseness lasts from two to four days, then you get constipation, fæces natural in colour, blood and mucus in the evacuation, but this is no doubt due to constipation having set in. The milk is diminished in quantity, which is noticed early; appetite varies, sometime they may eat during the whole course of the disease. The pupil of the eye contracted, this depends upon the time the disease has been going on. The urine from pink to black, it is not uncommon to find it dark from the very start, the animal passes a great quantity, but not as freely as is usual.

Course, Duration, and Termination.—The disease starts suddenly with diarrhœa, and if unattended ends in confirmed constipation in about four days. The urine is generally black the second day. If the disease is not attended to it will make short work of the beast, six days, or even less if the temperature is high; cases that die are generally from constipation, loss of blood, rupture, of the folds of stomach, or rupture of the gall bladder.

Prognosis.—Favourable as a rule, death is exceptional if treatment is started before constipation sets in. If no fæces pass after the beast is found there is a great risk. Even if the animal cannot stand when found and he passes some fæces there is still a good chance of recovery. Also even if the urine is still black after a week and the bowels have been acted upon, it will still be favourable. Bulls are most obstinate, although that may be that we do not give medicine strong enough.

Pathology.—The pathology of this disease is rather obscure, but my opinion is that the starting point is a gastro-enteric disturbance by which we have the liver congested, and in this disturbance by one or other we have a "toxin" formed which has the power of disintegrating the blood corpuscles, and this "toxin," which I have not christened, has a contracting power on certain muscles of the body, especially internal organs. This, I suggest, accounts for the closure of the bile duct, absence of peristaltic action of the bowels, peculiar action

of the heart, contracted pupils, also contracted sphincter ani, and tucked vulva. It has been suggested that it resembles azoturia in the horse; so it may, but in this we have a different animal to deal with, with its different assimilating power. Or I take it that the increased action of the bowels is caused by the congestion of the liver, the congestion caused by a shock to the gastro-enteric canal which forms this toxin that creates the mischief in the blood stream which to some extent affects the kidneys. After all, we cannot lose sight of the fact that this disease occurs so commonly in some localities and not at all in others. There must be something in the herbage of these localities that favour the formation of this toxin. That special diseases are found in special localities is well known.

Treatment.—The nursing of the animal is very important in this disease. Keep the animal as quiet as possible, in a warm and well ventilated shed, and if possible loose. Plenty of warm water or hay tea to drink, with bran mashes or linseed gruel. If the animal does not drink, pour in once a day a gallon or two of warm water with two ounces of carbonate of soda dissolved in it. The medicine that suggests itself if the temperature is high, say 104 to 106, is strong purgative —Glauber, or Epsom, rhubarb, quinine sulph., ferri carb. If temperature is pretty normal give purge, either mag. sulph, sodæ sulph., gamboge, aloes, rhubarb, jalap, ol. resin, or lini, also a good tonic in way of salts of iron, quinine and strychnine, some suggest alum, acid sulph. and opium or turpentine, but I do not wish to change unless I can get something cheaper and as effectual. Complications to be dealt with as they arise.

Prevention, after all, is better than cure. I have with success used the following: Sodæ sulph, sodæ hypo-sulph. 2 oz. of each, and ½ oz. zingib; give this as soon as they come on the new ground.

EXTRACTS AND NOTES

THE ETIOLOGY OF CANCER.

By Alex. Theodore Brand, V.D., M.D., C.M.,
Medical Officer, Driffield Cottage Hospital.

[Abstract.]

Dr. Brand, after observing that so far the search for the cause of cancer had been unsuccessful, and that no reliable empiric remedy for it had been discovered, said that a mental attitude of the most profound pessimism had been engendered in the medical profession amounting indeed to absolute fatalism, which existed, if possible, even more strongly among the laity. Defeat must not, however, he said, be permitted to paralyse our energies, but should rather be a stimulus to renewed efforts.

Dr. Brand then briefly reviewed some of the specific causes which had been suggested, such as over-indulgence in tea, in sugar, the consumption of tomatoes, excessive flesh eating, excessive consumption of common salt, all of which he dismissed as untenable. He then referred to the pathological theories as to the origin of cancer, and mentioned Cohnheim's theory of embryonic rudiments, Thiersch's theory that epithelioma is due to a war between columns of epithelial cells growing downwards and loops of blood vessels growing upwards, and Hansemann's theory that karyokinesis was concerned in the causation of cancer, while some observers, noticing the rapid karyokinetic evolution going on in the nuclei of developing tumour cells, had been deceived into believing that such cells were actual microzoa, so suggesting another theory, the parasitic theory of cancer. He referred also to the theory which attributes cancer to the spermatic influence of cells, and to Creighton's theory of an unconscious evil memory or bad habit of the tissues. He thought that most of these theories had been built up by microscopists in histological laboratories, and that, though interesting, they were at most only descriptive of pathological processes or suggestive of probably contributory factors, but did not suggest the originating cause of a specific disease.

Historical.

That cancer was infectious has long been a belief. In the middle of the seventeenth century Zacutus Lusitanus stated his belief that cancer was contagious, and cited cases. In 1672 Nicolaus Tulpius, the famous anatomist, whose portrait must be familiar to most from the picture painted by Rembrandt, was so sure of it that he stated that "an ulcerated cancer is just as contagious as an inflammation of the eyes." Juncker in 1731 said that successful engrafting necessitated that the infective material should fall on a suitable place where there was already a breach of the surface. In 1773 the Academy of Medicine at Lyons discussed the subject.

The Infection Theory.

In the absence of a demonstrated microbe the evidence for the exogenesis of cancer must be circumstantial, but the great central, fundamental, and most convincing argument in favour of this hypothesis was the incontrovertible fact that cancer, once generated, spread locally by infecting its immediate environment, and that it was disseminated metastatically by the blood current and lymph streams, the latter infecting glands *en route*.

Another very suggestive fact was that, while cancer was at the outset a purely local disease, it became eventually constitutional, one of the indications being the gradually establishment of a so called cachexia. This term cachexia, he imagined, simply meant that the victim of cancer had become saturated with the toxin of the bacterium causing the disease.

In other diseases where metastasis occurred, such as tubercle, actinomycosis, syphilis, and pyæmia, although the disease germs were transported by the blood and lymph, the cell elements themselves were not transported, as they were in cancer; but this difference from cancer did not militate in the slightest degree against the infection theory of cancer causation. It was only another example of the infinite variety to be found in germ-caused disease. Dr. Brand then continued as follows:

Selective Sites.

While primary cancer can be originated in practically any tissue it has an almost exclusive selective affinity for epithelial surfaces generally, and for the mucous membrane in particular. Its favourite sites are at places which are directly and easily accessible to infective germs. We find 55 per cent. of these sites in the alimentary canal which would suggest that the infective agent is ingested.

The remaining favourite sites are in the organs concerned in the reproduction of the species and the nutrition of the young.

These sites are not only suggestive of infection from without, but also of the probability that the micro-organism is a microphyte and not a microzoon. Wherever cancer grows luxuriantly and rapidly, we find present the chief desiderata for the growth of bacteria, namely, moisture, an eminently suitable nutrient medium, a constant temperature most favourable to the growth of pathogenic bacteria, and exclusion of light and air. One could hardly imagine a better culture chamber for bacterial growth than the ailmentary canal or uterus.

Conversely, we find that cancer has not been observed in the invertebrata, very rarely in the cold-blooded vertebrata. It is chiefly found in man and domesticated

mammalia. It is very rare in wild mammals. Bland-Sutton states that he found a mammary adenoma in a phalanger, and that this single case represents the extent of his knowledge concerning adenomata and carcinomata in wild mammals. This statement is emphasized by the fact that he was in close attendance in the Prosector's rooms of the Zoological Society's Gardens for eight years, during which time he was particularly on the look-out for tumours of all kinds.

Role of Irritation.

The infectiousness of cancer, like that of leprosy and tubercle, does not, fortunately, seem to be very great, otherwise the increase would be much greater than it is, and it is evident that something else is necessary besides a culture chamber. The nutrient material is not an inert substance like gelatine or bouillon, but is living tissue, capable of repelling the attacks of invading bacteria, so long as there is no breach in its continuity. When, however, this occurs, either by accident or from long-continued irritation, vulnerability is induced, especially if, at the same time, the general health is impaired. In all probability cancer does not arise in sound and healthy tissues. We generally find that it has arisen in situations where this breach of continuity has occurred.

For example, we get the lip irritated by an unglazed pipe stem, the tongue by ragged teeth, or whatever induces chronic superficial glossitis, or injured accidentally as by the prick of a bone, etc., the œsophagus injured in a similar way, or by scalding liquids; the stomach by chronic dyspepsia or ulceration; the intestines injured by foreign bodies such as pins, tacks, bones, etc.; the rectum by the same or by scybala, etc.; the anus by fissures, fistula, eczema, etc.

Again, in the case of the breast we find the nipple terribly irritated, excoriated, and fissured by lactation, while the gland itself may be injured by the blows and rough handling of impatient infants, or by accident. Paget's eczema of the nipple, like leukoplakia of the tongue, has probably no direct relationship to cancer, but these affections prepare so excellent a nidus for the infective agent, and are so conveniently situated for its reception, that they have come to be termed "precancerous." The lactiferous ducts also are very large in calibre, and very easily accessible.

The uterine cervix is rendered vulnerable in the parous woman, where it is stellate with the fissures of parturition, and both in her case and in that of the nulliparous or unmarried woman the cervix is frequently eroded by acrid discharges. From the uterus to the ovary, scarred all over by the rupture of numberless follicles, the transition is easy and the way open. No doubt the loose and open arrangement of the nether garments of the majority of women would naturally favour access to the generative organs of the infective micro-organism, especially if its habitat is the soil.

Thus we find that cancer arises generally in sites rendered vulnerable by injury or irritation, and this vulnerability is greater, *a fortiori*, in the middle-aged and old, in whom the resisting power is still further reduced from the fact that in them decay is in excess of the power to repair.

Auto-Inoculation.

Of authentic cases of auto-inoculation of cancer the number recorded is very considerable, and many must no doubt be familiar to you all.

Recently Ebert collected 23 cases of contact cancer, such as lip to lip, tongue to gum, one labium majus to another, etc., and mentions the case of a woman who inoculated the corner of her eye from a cancer on the back of her hand.

"Cancer a Deux."

In the *Deutsche Medicinische Wochenschrift* of June, 1901, Behla gives a number of instances of *cancer à deux*, quoting the names of the observers. Thus Boas mentions the case of a daughter who inoculated herself with rectal cancer by using the same enema syringe her mother had used during her fatal illness, which was of the same nature.

Tross reports a very interesting and most significant case. A man developed a carcinoma of the glans penis presenting a structure histologically identical with the cervical carcinoma from which his wife suffered. Other 30 cases of a similar nature were reported. Guelliot also has collected 28 such cases.

In my own practice a woman suffering from, and who died from, cancer of the breast was nursed assiduously during her illness by an apparently healthy woman of about 45 years of age. This woman developed cancer of the stomach, and died from it within twelve months of the death of the woman she had nursed. This nurse was practically in constant attendance upon the case of mammary cancer, and, not being a particularly cleanly person, it is more than probable that she had eaten her food with hands unwashed after dressing the ulcerated sore, of handling the dressings.

Accidental Inoculation in Connection with Operation.

Smith cites the case of a London hospital surgeon who developed cancer of the tongue after having accidentally got into his mouth some of the discharge from a cancerous breast. Budd mentions the case of a French hospital surgeon who died of cancer eight months after having injured himself during an operation on a cancerous patient. Guermonprez reports the case of a physician who developed cancer at a point where an acne pustule existed, infected during an operation for scraping a cancerous uterus.

Bland-Sutton says that it has been demonstrated beyond possibility of cavil that in women who have had their ovaries removed for adenomata it has been found that tumours have subsequently grown in the abdominal cicatrix, such tumours showing under the microscope the structure of ovarian adenoma. Since these tumours have been unassociated with any recurrence in the pelvis or secondary nodules in the peritoneum or viscera, the conclusion is irresistable that they were due to infection of the edges of the abdominal incision in the course of the operation of ovariotomy. Sippel has published a case of cancer inoculated along each one of the suture tracks made after extirpating a cancerous ovary.

No doubt the same local soiling of the edges of skin incisions in operation for cancer—for example, of the mamma—takes place, and this probably accounts for the presence of recurrence in the form of cancerous nodules so common in the cicatrices of breast cases.

Again, we find often that an extensive operation for cancer is followed by such rapid recurrence and such increased energy of growth that it is evident operation has hastened matters and caused a much worse state of things than non-interference would have done.

Bland-Sutton explains this by suggesting that in the operation the infected blood and lymph vessels, gorged with cancerous material, are divided, and the cancer cells let loose over the damaged tissues, which they infect, and so lead to a still more extensive outbreak of local cancer.

Experimental Inoculation.

Cancer has also been successfully inoculated experimentally, chiefly, however, on the lower animals.

Langenbeck made a watery emulsion of a soft cancer, mixed it with blood serum, and injected it into the femoral vein of a dog. Two months later, on section, nodules were found in the upper lobes of both lungs, and a vascular mass in the middle lobe of the right lung, which proved to be cancerous, and was found to be of

the same structure as the original growth. Follin and Lebert used injections made from a cancerous axillary lymphatic gland, and within fifteen days found in the animal several cancerous nodules in the lungs and liver. Gonjon has produced melano-sarcoma in small animals within fifteen days after inoculation. Bose alludes to three cases of inoculation from man to man done both intentionally and successfully, but is discreetly silent about details.

These are but few examples of many I could quote. I cannot but think that one is justified, even at the present time, in saying that, since auto-inoculation and accidental inoculation are so common, and experimental inoculation has been so successful, there should be no longer any doubt that cancer is in truth a contagious disease.

Cancer Districts.

With regard to locality, we find that cancer is more prevalent in some places than others, so much so that the former have been designated "cancer fields."

We find the highest death-rate from cancer in districts which lie low, and are liable to seasonal floodings, and characterised by alluvium and subsoils of the various clays. The favourite districts in the North and East Ridings of Yorkshire lie principally along the banks of the Ouse, the Derwent, and the Humber. I believe the Derwent region is locally called "The Cancer Valley." On the other hand, cancer is least prevalent in elevated districts where there is a good fall for drainage, freedom from floods, and characterised by porous subsoil, and the oldest palaeozoic rocks, especially the limestones.

Thus we find cancer most rampant where sewage is most difficult to be got rid of, and where it is most likely to be deposited and remain after floodings or high tides on a non-porous soil. This permits of and fosters the prolific growth of micro-organisms; and the frequent occurrence of shallow surface wells in such districts suggests an easy and extensive contamination of drinking water. It is not difficult, therefore, to realize how cancer may be spread in such localities, and the frequency of its occurrence in the alimentary system favours this view.

Cancer Houses and Rooms

As might be expected, we also find in these districts certain houses, and even certain rooms in houses, which seem to be cancer-haunted.

The authentic cases recorded are numerous, but as too much time would be necessary for detailing them, I shall quote only one or two instances.

In a house near London a room was occupied by three women in succession, who all died of cancer at fairly short intervals. Each of these women appeared to be in perfect health when she in turn came to occupy this room, and had lived in other rooms in the same house, but within a year of occupying this room they developed cancer. There was no relationship between them. No further cases of cancer occurred in this house after the room was thoroughly disinfected and the bedding burnt.

There is in Driffield a row of three notorious houses, or rather hovels, all under one roof, without drainage and with doubtful water supply, where I have attended cases of cancer in each, and in one of these houses more than one case. At present I have a case of cancer of the breast in one of these houses. There is also a narrow street in Driffield, undrained and also with doubtful water supply, where cancer is especially common. It was in one of these houses that the two cases occurred which I mentioned under the subject of *cancer à deux*.

Such circumstances as these appear to me to strongly suggest that cancer is infective, and alsothat locality is a factor in its transmission.

Geological Distribution.

Cancer seems to be chiefly a disease of temperate regions, avoiding the extremes of temperature such as exist in Greenland or Iceland, and the tropics. Although the extremest cold has no destructive effect upon bacteria or their spores, it certainly keeps them dormant, and this would explain the paucity of cases of cancer in cold climates.

It is not so easy to account for the alleged infrequency of cancer in the tropics, but it is probably more apparent than real, and may be due to less accurate supervision of disease in these regions; besides, as a matter of fact, cancer is very common in many parts of India and China. One reason why so little disease and so few cases of old age are seen among savage peoples, for example in Central and South Africa, is the regular, unostentatious, and mysterious disappearance of such useless individuals, about whose fate no one exhibits any inconvenient curiosity!

Again one need not be surprised to find in the distant islands of the Pacific a healthy native population. They live much in the open air, in an atmosphere practically free from pathogenic germs, so long as contamination from without does not reach them; but the very disastrous results of imported disease, such as small-pox, measles, syphilis, etc., are notorious, and one can easily believe that the advent of cancer-bearing individuals would be followed by the spread of this disease also.

Ethnological.

The freedom of certain peoples from cancer does not appear to be due to individual immunity, but to the accident of locality and environment, and the mode of life. Under favourable conditions any one may became a victim to cancer.

There is a popular belief that Jews as a race are remarkably exempt from cancer, but this belief is quite erroneous, as is shown by cancer statistics. One reason alleged for this is that Jews, generally speaking, have a great repugnance to become inmates of hospitals where Gentiles are in attendance, and thus few cases are found in these institutions. Private practitioners do not find that Jews exhibit any immunity from cancer in general. The male Jew may unquestionably claim perfect immunity from one form of cancar which his Gentile brother may suffer from, but apart of this he is equally vulnerable and liable.

Heredity.

With regard to heredity, he observed that the children of cancerous parents might possibly acquire more or less vulnerability congenitally, as in the analogous case of tubercle, but that it was most improbable that the disease itself could be transmitted. The occurrence of cancer in several members of a family after the death of parents from that disease could not be accepted as evidence of heredity; but, on the contrary, could and ought to be accepted as evidence of infection from an obvious source.—*B.M.J.*

PARLIAMENTARY.

The Remount Scandals.

In a discussion in the House of Commons Mr. Brodrick said:—"The Hungarian business was denounced by the member for Dulwich, who was instrumental in bringing to light what had been called the scandals in regard to the horse purchases in Hungary. (Hear, hear.) He would tell the Committee what had occurred during the present year. He went to the member for Dulwich and asked him whether, as the Government had ceased purchasing Hungarian horses and were buying Russian horses, he would favour him by putting him in a position

to buy the class of horse in Hungary which he said could be bought, but which the Government, by the conduct of the War Office and their entire neglect of the public interest, had failed to obtain. His hon. friend met him in the most friendly spirit. He undertook to send out his own trainer, Mr. Waugh, who spoke Hungarian, and to put the War Office in communication with certain Hungarian magnates who, his hon. friend assured him, were beyond suspicion in the matter of horse dealing—(laughter)—and who were only anxious to retrieve the character of their country as a horse market for the world. He was glad to accept his hon. friend's suggestion, but he told him that the War Office, of course, could not undertake to buy any number of Hungarian horses until it was shown that a better class could be produced than had been obtained through other channels. Mr. Waugh went out and conducted these negotiations. He was not limited as to price. He suggested a price £6 or £8 more than had been given in Hungary, and the War Office were to get the best horses of the cavalry class. At the wish of those concerned a special commission was sent out to inspect the horses, and their reports showed that after paying a larger price, after sending out a special commission, after going to a class of persons who, they were assured, were most anxious to serve them, they were disappointed in the class of horse brought before the inspectors, who had to reject so large a number that the contractors at one time said they would not submit any more, because it did not pay them to have them rejected. Ultimately the number required was made up. When that assignment of horses arrived in South Africa it was not favourably reported on, and he had been assured—though up to the present moment he had not been able to verify the statements—that that contract, like the others, had been sub-let, and that a number of the horses had actually been bought from the War Office contractor who had been denounced in the House. (Laughter.) He could only draw the conclusion from these circumstances that the horse, which was by no means an immoral animal itself, was the cause of much immorality in others. (Laughter.) Wherever the War Office bought horses, in this country or elsewhere, they met with the same difficulties. As to the purchase of horses in the future, his noble friend the Financial Secretary to the War Office was giving the subject his attention, and he hoped to be able to announce next year the course to be adopted, which he hoped would largely provide against the recurrence of the difficulties they had had to contend against in the past. His hon. friend the member for Taunton had truly said that the Remount Department had been too much blackened in the course of the discussion on the affairs of the department six months ago. The inspectors whom he had sent to report on the purchase of horses in America, Canada, Hungary, South Africa, and Australia had nearly all sent in their reports. The publication of these reports had been asked for. He did not think there would be any difficulty in making them public, and he was willing to give all the information it was in his power to give; but he should like to say at once, on behalf of some of the officers of the Remount Department, that he thought they had been hardly dealt with by public opinion. (Hear, hear.) The officer of the department in New Orleans, despite the difficulties of the climate, had done excellent service. Good work had also been done in Canada. The operations in Russia also were a credit to all concerned. He did not think that Lord Kitchener himself would join in the outcry which had been raised against the Remount Department. They must look to South Africa itself, to some extent, for the blame of what had occurred, in the want of care shown in sending the horses up country before they were fit, or in mixing them with those that were unfit, and they must not bestow all their censure upon those who had selected the horses. (Hear, hear.) He spoke freely on the subject, as he had urged Lord Kitchener to commandeer all the horses he could obtain in the parts of Cape Colony which were under martial law, so that they might be far ahead of their needs. He thought it just to make those remarks in the interest of the officers of the Remount Department, who had worked so hard for the last two years. (Hear, hear.)

The Remount Officers in Canada.

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the same structure as the original growth. Follin and Lebert used injections made from a cancerous axillary lymphatic gland, and within fifteen days found in the animal several cancerous nodules in the lungs and liver. Gonjon has produced melano-sarcoma in small animals within fifteen days after inoculation. Bose alludes to three cases of inoculation from man to man done both intentionally and successfully, but is discreetly silent about details.

These are but few examples of many I could quote. I cannot but think that one is justified, even at the present time, in saying that, since auto-inoculation and accidental inoculation are so common, and experimental inoculation has been so successful, there should be no longer any doubt that cancer is in truth a contagious disease.

Cancer Districts.

With regard to locality, we find that cancer is more prevalent in some places than others, so much so that the former have been designated "cancer fields."

We find the highest death-rate from cancer in districts which lie low, and are liable to seasonal floodings, and characterised by alluvium and subsoils of the various clays. The favourite districts in the North and East Ridings of Yorkshire lie principally along the banks of the Ouse, the Derwent, and the Humber. I believe the Derwent region is locally called "The Cancer Valley." On the other hand, cancer is least prevalent in elevated districts where there is a good fall for drainage, freedom from floods, and characterised by porous subsoil, and the oldest palaeozoic rocks, especially the limestones.

Thus we find cancer most rampant where sewage is most difficult to be got rid of, and where it is most likely to be deposited and remain after floodings or high tides on a non-porous soil. This permits of and fosters the prolific growth of micro-organisms; and the frequent occurrence of shallow surface wells in such districts suggests an easy and extensive contamination of drinking water. It is not difficult, therefore, to realize how cancer may be spread in such localities, and the frequency of its occurrence in the alimentary system favours this view.

Cancer Houses and Rooms

As might be expected, we also find in these districts certain houses, and even certain rooms in houses, which seem to be cancer-haunted.

The authentic cases recorded are numerous, but as too much time would be necessary for detailing them, I shall quote only one or two instances.

In a house near London a room was occupied by three women in succession, who all died of cancer at fairly short intervals. Each of these women appeared to be in perfect health when she in turn came to occupy this room, and had lived in other rooms in the same house, but within a year of occupying this room they developed cancer. There was no relationship between them. No further cases of cancer occurred in this house after the room was thoroughly disinfected and the bedding burnt.

There is in Driffield a row of three notorious houses, or rather hovels, all under one roof, without drainage and with doubtful water supply, where I have attended cases of cancer in each, and in one of these houses more than one case. At present I have a case of cancer of the breast in one of these houses. There is also a narrow street in Driffield, undrained and also with doubtful water supply, where cancer is especially common. It was in one of these houses that the two cases occurred which I mentioned under the subject of *cancer à deux*.

Such circumstances as these appear to me to strongly suggest that cancer is infective, and alsothat locality is a factor in its transmission.

Geological Distribution.

Cancer seems to be chiefly a disease of temperate regions, avoiding the extremes of temperature such as exist in Greenland or Iceland, and the tropics. Although the extremest cold has no destructive effect upon bacteria or their spores, it certainly keeps them dormant, and this would explain the paucity of cases of cancer in cold climates.

It is not so easy to account for the alleged infrequency of cancer in the tropics, but it is probably more apparent than real, and may be due to less accurate supervision of disease in these regions; besides, as a matter of fact, cancer is very common in many parts of India and China. One reason why so little disease and so few cases of old age are seen among savage peoples, for example in Central and South Africa, is the regular, unostentatious, and mysterious disappearance of such useless individuals, about whose fate no one exhibits any inconvenient curiosity!

Again one need not be surprised to find in the distant islands of the Pacific a healthy native population. They live much in the open air, in an atmosphere practically free from pathogenic germs, so long as contamination from without does not reach them; but the very disastrous results of imported disease, such as small-pox, measles, syphilis, etc., are notorious, and one can easily believe that the advent of cancer-bearing individuals would be followed by the spread of this disease also.

Ethnological.

The freedom of certain peoples from cancer does not appear to be due to individual immunity, but to the accident of locality and environment, and the mode of life. Under favourable conditions any one may became a victim to cancer.

There is a popular belief that Jews as a race are remarkably exempt from cancer, but this belief is quite erroneous, as is shown by cancer statistics. One reason alleged for this is that Jews, generally speaking, have a great repugnance to become inmates of hospitals where Gentiles are in attendance, and thus few cases are found in these institutions. Private practitioners do not find that Jews exhibit any immunity from cancer in general. The male Jew may unquestionably claim perfect immunity from one form of cancar which his Gentile brother may suffer from, but apart of this he is equally vulnerable and liable.

Heredity.

With regard to heredity, he observed that the children of cancerous parents might possibly acquire more or less vulnerability congenitally, as in the analogous case of tubercle, but that it was most improbable that the disease itself could be transmitted. The occurrence of cancer in several members of a family after the death of parents from that disease could not be accepted as evidence of heredity; but, on the contrary, could and ought to be accepted as evidence of infection from an obvious source.—*B.M.J.*

PARLIAMENTARY.

The Remount Scandals.

In a discussion in the House of Commons Mr. Brodrick said:—"The Hungarian business was denounced by the member for Dulwich, who was instrumental in bringing to light what had been called the scandals in regard to the horse purchases in Hungary. (Hear, hear.) He would tell the Committee what had occurred during the present year. He went to the member for Dulwich and asked him whether, as the Government had ceased purchasing Hungarian horses and were buying Russian horses, he would favour him by putting him in a position

to buy the class of horse in Hungary which he said could be bought, but which the Government, by the conduct of the War Office and their entire neglect of the public interest, had failed to obtain. His hon. friend met him in the most friendly spirit. He undertook to send out his own trainer, Mr. Waugh, who spoke Hungarian, and to put the War Office in communication with certain Hungarian magnates who, his hon. friend assured him, were beyond suspicion in the matter of horse dealing—(laughter)—and who were only anxious to retrieve the character of their country as a horse market for the world. He was glad to accept his hon. friend's suggestion, but he told him that the War Office, of course, could not undertake to buy any number of Hungarian horses until it was shown that a better class could be produced than had been obtained through other channels. Mr. Waugh went out and conducted these negotiations. He was not limited as to price. He suggested a price £6 or £8 more than had been given in Hungary, and the War Office were to get the best horses of the cavalry class. At the wish of those concerned a special commission was sent out to inspect the horses, and their reports showed that after paying a larger price, after sending out a special commission, after going to a class of persons who, they were assured, were most anxious to serve them, they were disappointed in the class of horse brought before the inspectors, who had to reject so large a number that the contractors at one time said they would not submit any more, because it did not pay them to have them rejected. Ultimately the number required was made up. When that assignment of horses arrived in South Africa it was not favourably reported on, and he had been assured—though up to the present moment he had not been able to verify the statements—that that contract, like the others, had been sub-let, and that a number of the horses had actually been bought from the War Office contractor who had been denounced in the House. (Laughter.) He could only draw the conclusion from these circumstances that the horse, which was by no means an immoral animal itself, was the cause of much immorality in others. (Laughter.) Wherever the War Office bought horses, in this country or elsewhere, they met with the same difficulties. As to the purchase of horses in the future, his noble friend the Financial Secretary to the War Office was giving the subject his attention, and he hoped to be able to announce next year the course to be adopted, which he hoped would largely provide against the recurrence of the difficulties they had had to contend against in the past. His hon. friend the member for Taunton had truly said that the Remount Department had been too much blackened in the course of the discussion on the affairs of the department six months ago. The inspectors whom he had sent to report on the purchase of horses in America, Canada, Hungary, South Africa, and Australia had nearly all sent in their reports. The publication of these reports had been asked for. He did not think there would be any difficulty in making them public, and he was willing to give all the information it was in his power to give; but he should like to say at once, on behalf of some of the officers of the Remount Department, that he thought they had been hardly dealt with by public opinion. (Hear, hear.) The officer of the department in New Orleans, despite the difficulties of the climate, had done excellent service. Good work had also been done in Canada. The operations in Russia also were a credit to all concerned. He did not think that Lord Kitchener himself would join in the outcry which had been raised against the Remount Department. They must look to South Africa itself, to some extent, for the blame of what had occurred, in the want of care shown in sending the horses up country before they were fit, or in mixing them with those that were unfit, and they must not bestow all their censure upon those who had selected the horses. (Hear, hear.) He spoke freely on the subject, as he had urged Lord Kitchener to commandeer all the horses he could obtain in the parts of Cape Colony which were under martial law, so that they might be far ahead of their needs. He thought it just to make those remarks in the interest of the officers of the Remount Department, who had worked so hard for the last two years. (Hear, hear.)

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Mr. Caldecutt said that the mare in question belonged to the Hoole Bus Co., and on the 12th June it fell lame, and they requisitioned the services of the defendant, who acted as a sort of veterinary surgeon to the Company. He seemed to think the best thing was to "fire" her, and thereupon he took the mare to his smithy and "fired" her between the knee and the hoofs in a great many places, there being 13 marks on one leg and 11 on another. Years ago firing was a remedy used in extreme cases, but it was seldom done now. In this case Jones took upon himself to decide that the mare was suffering from side-bone, and treated it in the manner he had described. A week after this event Inspector Blake Jones' attention was called to the matter, and he went and saw the mare at the Company's stable at the Ermine Hotel, and he would tell the Bench that the searing with the hot iron had been done in such a unskilful way that it appeared to be one mass of wounds from which matter was discharging. In order to save the animal's life Mr. Edwards, veterinary surgeon, was called in, and he would tell them that the reason which Jones gave for firing the animal was altogether wrong, as there was neither ring-bone or side-bone. Besides that the "firing" was unskilfully done, and must have caused dreadful pain. He thought the company was to blame for not calling in a professional man instead of a kind of "quack."

Inspector Blake Jones, of the R.S.P.C.A., said he saw the mare in company with P.C. Brewster, of the Hoole Constabulary. Both fore legs had been unskilfully fired, and were in a disgraceful state from the hoof to the knee. The marks were most irregular and numerous, and deeper than any professional man would make on a horse, the wounds having gone through the tissues. On the near foreleg were 13 wounds, and on the other 11, these wounds nearly encircling the whole leg, discharging matter, and looking almost like one continuous wound. On the off fore leg were eight wounds outside and six inside, these also nearly encircling the leg. He looked for but could find no traces of ringbone or side-bone, the only cause of lameness that he could see being a small corn. It had been most unskilfully operated upon for a useless purpose. Jones told him that he did all the Company's veterinary work as one or two veterinary surgeons who had been called in had made mistakes.

In cross-examination the Inspector said that "firing" was sometimes necessary, and that any pain caused under those circumstances could not be called cruel. Asked if he would have taken proceedings supposing this "firing" had been done by a veterinary surgeon he replied that he could not suppose such a thing. He would not say that people should be forced to consult a vet. every time a horse went lame.

P.C. Brewster corroborated, and said that the mare must have suffered intense pain, as she could hardly bear her foot on the ground.

Mr. R. C. Edwards said he examined the horse on the 20th June, and found that it had been fired from the fetlock up to knee on each leg. If the operator went through the skin he would cause pain. To "fire" a horse when it was not required was extreme and needless cruelty. In his opinion the operation in this case was not necessary, at any rate there was neither ringbone nor side-bone. Anyone could tell that the firing had been done by a novice.

By Mr. Mason: Jones had not only wrongly diagnosed the case and shown gross carelessness, but gross ignorance. A horse could be fired without going through the skin, but a man should have proper training to do it. In a high-bred horse the skin would be more delicate than the crocks belonging to this 'bus company, which had only been in existence three months, and had purchased their horses off the streets.

The defendant then entered the box, and said that he received a postcard from Mr. E. Andrews, secretary to the Hoole Bus Co., asking him to fire and blister the mare, but admitted in cross-examination that he had himself told the committee that that operation would be necessary. He treated the horse for overdrawn tendons, and not for side-bone; he had never told the inspector that the animal suffered from side-bone. He did not think the services of a veterinary surgeon were necessary, as he had "fired" horses previously. The horse was not lame now, in fact he had intended bringing it for inspection of the bench, but could not catch it after chasing it for an hour and a half in the field.

Mr. Mason, for the defence, said that the defendant might have been guilty of carelessness or ignorance, but of intentional cruelty it was absurd to suppose that a farrier, who was accustomed to deal with horses every day of his life, would be guilty. And if he honestly believed that what he did was for the animal's good then any pain which he might have inflicted did not come under the heading of cruelty. Probably he (Mr. Mason) would have sought the services of a professional man, but he had yet to learn that people were to be forced to send for a veterinary surgeon every time a horse went lame. It had been held that a guilty knowledge was a necessary ingredient in a case of this kind before a conviction could be obtained. He submitted that the facts had been exaggerated, and magnified beyond recognition, and that what defendant did he did with the best intentions.

After a short retirement the Chairman said that from the evidence put forth they considered that cruelty had been practiced in the treatment of the horse, and inflicted a penalty of 10s., and costs, including the veterinary surgeon's but not the advocate's fee.—*Chester Chronicle*, August 2.

Personal.

To the Editor of *The Veterinary Record*.

Sir,

During my recent severe indisposition from which I am glad to say I am now recovering (thanks to the skill of my friend Sir Victor Horsley). I have received many letters of condolence and sympathy not only from my immediate friends in the profession but also from many others with whom I am not personally acquainted. I fear that owing to my inability to write during the first few weeks after my operation I may have omitted to acknowledge the receipt of all these communications, and it is under these circumstances that I ask you to allow me, through the medium of your widely spread journal, to thank all my friendly correspondents for their kindness, and also express my high appreciation and gratitude for the interest which they have extended to me.—Yours truly,

ALEX. C. COPE.

Board of Agriculture,
4, Whitehall Place, S.W.
August 14th, 1902.

A marriage was solemnised at St. Gregory's Cheltenham, between Mr. W. Awde, F.R.C.V.S., Stockton, and Miss Mary Agnes Carter, eldest daughter of Mr. William Weldon Carter, of Gotherington, Cheltenham, late of Stockton. The officiating clergyman was the Rev. Father Tenney, O.S.B. The bride was given away by her father, and was accompanied by her sister, Miss Maria Carter, as bridesmaid, the best man being Mr. W. Newton Dobbing, M.R.C.V.S., Darlington. The newly-married couple left, amid the hearty good wishes of their many friends, to spend the honeymoon at Ilfracombe. They were the recipients of a considerable number of valuable presents.

On the 30th July at Christchurch, Harrogate, by the Lord Bishop of Richmond, assisted by the Rev. S. W. Cope, Vicar of Bramley, and the Rev. R. W. Fawkes, Vicar of the parish, W. M. Scott, F.R.C.V.S., of Bridgwater, Somerset, to Harriet Lilian, second daughter of the late Rev. Edward C. Lister, Rector of Stanningley, Yorkshire.

COMMUNICATIONS, BOOKS, AND PAPERS RECEIVED.—Messrs. W. N. Dobbing, W. M. Scott, A. C. Cope. F.E.P.

The Breeding in Canada of Horses for the Army, by J. G. Rutherford; *Agricultural Journal* (Cape, July), *West Somerset Free Press*.

NEWS CUTTINGS:—A convenient method is to send the page of the newspaper containing the marked paragraph in an unsealed envelope. The postage is ½d.

Original articles and reports should be written on one side only of the paper and authenticated by the names and addresses of the writers, not necessarily for publication.

Communications for the Editor to be addressed 20 Fulham Road, S.W.